medical instrumentation

Heart sonar images

The latest in a variety of cardiac instruments that have been spun off from space technology—such as the pacemaker and biomedical electrodes— an echo-cardioscope now has emerged.

NASA-Ames engineers developed the instrument to monitor cardiac functions of astronauts in flight. It forms images of internal structures using high-frequency sound—in much the same way that submarines detect underwater objects with sonar. The instrument is compact, lightweight and portable, and dc-powered for safety.

The new technique could replace catheterization, a difficult procedure in which plastic tubes are threaded through blood vessels until they reach the heart. In that technique, a dye is injected into the tube, or catheter, and X-ray motion pictures are taken. Obviously the method is cumbersome and even risky.

Stanford University cardiologists validated the image quality and ease of operation of the ultrasonic device while working with a test group of 100 patients, including 40 infants. Results were excellent.

Twenty of the infants were acutely ill, housed in incubators and monitored with a variety of electrical equipment. These babies are particularly susceptible to electric-shock hazards and repeated doses of X-rays. The battery-powered ultrasonic device, being isolated from its electrical environment, has an inherent safety advantage.

Sick babies were among a test group of 100 patients whose cardiac functions were determined by ultrasonics instead of X-rays. The safer instrumentation was derived from that used to monitor heart functions of astronauts in space.

Biomedical conferences

Frequently in science, one highly specialized discipline is unaware of relevant advances made in other areas. In an attempt to familiarize researchers in a variety of disciplines with medical problems and needs, NASA has sponsored conferences that bring together university scientists, practicing physicians, and manufacturers of medical instruments.

The first International Conference on Biomedical Electrodes Technology, held in 1973 at Stanford University, was one of these. Another, last July, was held on Cardiovascular Imaging and Image Processing.

The heart-imaging conference related NASA technology developed for processing satellite photographs to improving pictures of the heart. X-ray motion pictures and sonar images of the beating heart can be enhanced by computer techniques just as are space photographs.

Both conferences were held by the NASA Biomedical Application Team at Stanford University Medical School. As a result of the electrode conference, several companies have adapted the space technology to make a soft, flexible, surface electrode for long-term monitoring of heart patients. In Vivo Metric Systems Co., Redwood Valley, Calif., already has produced cardiac electrodes based on NASA technology.

Arteriosclerosis detection

Early detection of arteriosclerosis, or hardening of the arteries, is extremely important since, among diseases, it is one of the leading killers in the U.S.